WHAT IS CLAIMED IS:

1. An active inductor comprising:

a first and a second capacitance, each having a first and a second end;

a first, a second, a third, and a fourth voltage line;

a first, a second, and a third transistive element, each transistive element comprising an input, an output, and a control; and

a nonlinear circuit element comprising an input and an output,

wherein the output of said first transistive element is electrically connected to an output port and to the input of said second transistive element, the control of said second transistive element is electrically connected to said first voltage line and to the first ends of said first and second capacitances, the first ends of said first and second capacitances are electrically connected together, the output of said second transistive element is electrically connected to the input of said third transistive element, the second end of said second capacitance is electrically connected to the control of said first transistive element and to said second voltage line, the second end of said first capacitance is electrically connected to the output of said third transistive element and to said third voltage line, the input of said first transistive element is electrically connected to said fourth voltage line and to the input of said nonlinear circuit element, and the output of said nonlinear circuit element is electrically connected to the control of said third transistive element.

2. An active inductor according to claim 1, further comprising a fifth voltage line, where said fifth voltage line is electrically connected to the output of said nonlinear circuit element and to the control of said third transistive element.

3. An active inductor according to claim 1, wherein said nonlinear circuit element comprises a bipolar transistor arranged in diode and having an emitter for the output and a collector for the input and further comprising a base, the base being electrically connected to the collector.

4. An active inductor according to Claim 1, further comprising a first, second, third, and fourth voltage supply, each voltage supply being electrically connected to the respective voltage line.

5. An active inductor according to claim 1, wherein said first, second, and third transistive elements comprise bipolar transistors having a collector for the input, an emitter for the output, and a base for the control.

6. An active inductor according to Claim 5, wherein said capacitances comprise capacitors.

7. An active inductor according to Claim 5, wherein said nonlinear circuit element comprises a bipolar transistor arranged in diode and having an emitter for the output and a collector for the input and further comprising a base, the base being electrically connected to the collector.

8. An active inductor according to Claim 7, further comprising a fifth voltage line, where said fifth voltage line is electrically connected to the emitter of said bipolar transistor arranged in diode and to the base of said third transistor.

9. An active inductor according to Claim 7, further comprising a first, second, third, and a fourth voltage supply, each voltage supply being electrically connected to the respective voltage line.

10. An active inductor according to Claim 7, wherein the active inductor is fabricated on a single substrate.

11. An active inductor according to Claim 10, wherein said substrate comprises Silicon.

12. An active inductor according to Claim 7, wherein said first second, and third bipolar transistors and said bipolar transistor arranged in diode are Silicon based.

13. An active inductor according to Claim 12, wherein the active inductor is fabricated on a single substrate comprising Silicon.

14. An oscillator comprising an RLC circuit in a feedback loop, said RLC circuit comprising a capacitive element and an active inductor which are electrically connected to one another, said active inductor comprising:

a first and a second capacitance, each having a first and a second end;

a first, a second, a third, and a fourth voltage line;

a first, a second, and a third transistive element, each transistive element comprising an input, an output, and a control; and

a nonlinear circuit element comprising an input and an output,

wherein the output of said first transistive element is electrically connected to an output port and to the input of said second transistive element, the control of said second transistive element is electrically connected to said first voltage line and to the first ends of said first and second capacitances, the first ends of said first and second capacitances are electrically connected together, the output of said second transistive element is electrically connected to the input of said third transistive element, the second end of said second capacitance is electrically connected to the control of said first transistive element and to said second voltage line, the second end of said first capacitance is electrically connected to the output of said third transistive element and to said third voltage line, the input of said first transistive element is electrically connected to said fourth voltage line and to the input of said nonlinear circuit element, and the output of said nonlinear circuit element is electrically connected to the control of said third transistive element.

15. An oscillator according to Claim 14, wherein:

said first, second, and third transistive elements comprise bipolar transistors having a collector for the input, an emitter for the output, and a base for the control,

said nonlinear circuit element comprises a bipolar transistor arranged in diode and having an emitter for the output and a collector for the input and further comprising a base which is electrically connected to the collector, and

said capacitances and said capacitive element comprise capacitors.

16. An oscillator comprising a selection means for selecting a resonant frequency, said selection means including an active inductor, said active inductor comprising:

a first and a second capacitance, each having a first and a second end;

a first, a second, a third, and a fourth voltage line;

a first, a second, and a third transistive element, each transistive element comprising an input, an output, and a control; and

a nonlinear circuit element comprising an input and an output,

wherein the output of said first transistive element is electrically connected to an output port and to the input of said second transistive element, the control of said second transistive element is electrically connected to said first voltage line and to the first ends of said first and second capacitances, the first ends of said first and second capacitances are electrically connected together, the output of said second transistive element is electrically connected to the input of said third transistive element, the second end of said second capacitance is electrically connected to the control of said first transistive element and to said second voltage line, the second end of said first capacitance is electrically connected to the output of said third transistive element and to said third voltage line, the input of said first transistive element is electrically connected to said fourth voltage line and to the input of said nonlinear circuit element, and the output of said nonlinear circuit element is electrically connected to the control of said third transistive element.

17. An oscillator according to claim 16, wherein:

said first, second, and third transistive elements comprise bipolar transistors having a collector for the input, an emitter for the output, and a base for the control,

said nonlinear circuit element comprises a bipolar transistor arranged in diode and having an emitter for the output and a collector for the input and further comprising a base which is electrically connected to the collector, and

said capacitances comprise capacitors.

18. An adaptive amplifier comprising:

at least one amplification stage having an input and an output; and

an input and an output active matching element, each of said matching elements comprising an active inductor, said input matching element being electrically connected to the input of said amplification stage, said output matching element being electrically connected to the output of said amplification stage, and said active inductor comprising:

a first and a second capacitance, each having a first and a second end;

a first, a second, a third, and a fourth voltage line;

a first, a second, and a third transistive element, each transistive element comprising an input, an output, and a control; and

a nonlinear circuit element comprising an input and an output,

wherein the output of said first transistive element is electrically connected to an output port and to the input of said second transistive element, the control of said second transistive element is electrically connected to said first voltage line and to the first ends of said first and second capacitances, the first ends of said first and second capacitances are electrically connected together, the output of said second transistive element is electrically connected to the input of said third transistive element, the second end of said second capacitance is electrically connected to the control of said first transistive element and to said second voltage line, the second end of said first capacitance is electrically connected to the output of said third transistive element and to said third voltage line, the input of said first transistive element is electrically connected to said fourth voltage line and to the input of said nonlinear circuit element, and the output of said nonlinear circuit element is electrically connected to the control of said third transistive element.

19. An adaptive amplifier according to claim 18, wherein:

said first, second, and third transistive elements comprise bipolar transistors having a collector for the input, an emitter for the output, and a base for the control,

said nonlinear circuit element comprises a bipolar transistor arranged in diode and having an emitter for the output and a collector for the input and further comprising a base which is electrically connected to the collector, and

said capacitances comprise capacitors.

20. An adaptive amplifier according to claim 18 comprising at least two amplification stages, wherein each amplification stage comprises at least one Field Effect Transistor.

21. An adaptive amplifier according to claim 20, wherein said amplification stages comprise a first and a second amplification stage, said first amplification stage comprising three MOSFET's, said second amplification stage comprising one MOSFET, and each MOSFET having a gate length of about 300 μm.

22. An adaptive amplifier according to claim 21, further comprising at least one interior active inductor being positioned between said first and second amplification stages.

23. An adaptive amplifier according to claim 22, wherein at least two interior active inductors are positioned between said first and second amplification stages.

24. A mixer having a first input comprising a first frequency f_1 and a second input comprising a second frequency f_2, said mixer comprising:

mixing means for mixing the first and second inputs to produce an output having an additive frequency component f_+ and a difference frequency component f_-, where:

$f_+ = f_1 + f_2$,

f_- = absolute value $(f_1 - f_2)$; and

an active load comprising a Field Effect Transistor (FET),

wherein said active load is electrically connected to said mixing means and provides a variable load on said mixing means.

25. A mixer according to claim 24, wherein said FET comprises a MOSFET.

26. A doubler comprising:

doubling means for outputting an output frequency which is double an input frequency; and

a by-pass switch comprising a Field Effect Transistor (FET),

wherein said by-pass switch by-passes said doubling means upon application of a switching gate voltage to said FET causing the output frequency to be equal to the input frequency.

27. A doubler according to claim 26, wherein said FET comprises a MOSFET.

28. A transceiver comprising:

a first adaptive amplifier having an output comprising a first frequency f_1, said amplifier comprising amplification means and active matching means for providing active matching at an input and output of said amplification means;

a first mixer having a first input comprising the output of said adaptive amplifier and a second input comprising a reference signal having a reference frequency f_2, said mixer comprising:

mixing means for mixing the first and second inputs to produce an output having an additive frequency component f_+ and a difference frequency component f_-, where:

$f_+=f_1 + f_2$,

f_-= absolute value $(f_1 - f_2)$, and

active load means for providing a variable load on said mixing means; and

a first intermediate frequency amplifier,

wherein the output of said first mixer is input to said first intermediate frequency amplifier.

29. A transceiver according to Claim 28, further comprising:

a second intermediate frequency amplifier having an output;

a limiter having an output comprising a third frequency f_3, said limiter comprising active load means for providing a variable load;

a second mixer having a first input comprising the output of said limiter and a second input comprising the reference signal with frequency f_2, said mixer comprising:

mixing means for mixing the first and second inputs to produce an output having an additive frequency component f_+ and a difference frequency component f_-, where:

$f_+=f_3 + f_2$,

f_-= absolute value $(f_3 - f_2)$, and

active load means for providing a variable load on said mixing means; and

a second adaptive amplifier comprising amplification means and active matching means for providing active matching at an input and output of said amplification means,

wherein the output of said second intermediate frequency amplifier is input to said limiter, and the output of said second mixer is input to said second adaptive amplifier.

30. A transceiver according to claim 29, further comprising:

a doubler having an output and comprising:

doubling means for outputting an output frequency which is double an input frequency, and

an active by-pass switch comprising a Field Effect Transistor (FET) and by-passing said doubling means upon application of a switching gate voltage to said FET causing the output frequency to be equal to the input frequency; and

a buffer amplifier outputting the reference signal having the reference frequency f_2 to said first and second mixers,

wherein the output of said doubler is input to said buffer amplifier.

31. A transceiver comprising:

an intermediate frequency amplifier having an output;

a limiter having an output comprising a first frequency f_1, said limiter comprising active load means for providing a variable load;

a mixer having a first input comprising the output of said limiter and a second input comprising a reference frequency f_2, said mixer comprising:

mixing means for mixing the first and second inputs to produce an output having an additive frequency component f_+ and a difference frequency component f_-, where:

$f_+ = f_1 + f_2$,

f_- = absolute value $(f_1 - f_2)$, and

active load means for providing a variable load on said mixing means; and

an adaptive amplifier comprising amplification means and active matching means for providing active matching at an input and output of said amplification means,

wherein the output of said intermediate frequency amplifier is input to said limiter, and the output of said mixer is input to said adaptive amplifier.